

PATENT COOPERATION TREATY

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From the INTERNATIONAL SEARCHING AUTHORITY

PCT Parsons Hsue & de Runtz LLP

To:
 PARSONS HSUE & DE RUNTZ LLP
 Attn. Parsons, Gerald P.
 655 Montgomery Street
 Suite 1800
 San Francisco, CA 94111
 UNITED STATES OF AMERICA

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year)

31/05/2005

Applicant's or agent's file reference SNDK.241W00	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US2004/031788	International filing date (day/month/year) 28/09/2004
Applicant SANDISK CORPORATION	

1. The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet:

2. The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
 no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Ivetta Bujanska
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NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/ is filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SNDK.241W00	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2004/031788	International filing date (day/month/year) 28/09/2004	(Earliest) Priority Date (day/month/year) 03/10/2003
Applicant SANDISK CORPORATION		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
 - a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
 - With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.
 2. Certain claims were found unsearchable (See Box II).
 3. Unity of invention is lacking (see Box III).
 4. With regard to the title,
 - the text is approved as submitted by the applicant.
 - the text has been established by this Authority to read as follows:
 5. With regard to the abstract,
 - the text is approved as submitted by the applicant.
 - the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
 6. With regard to the drawings,
 - a. the figure of the drawings to be published with the abstract is Figure No. 8
 - as suggested by the applicant.
 - as selected by this Authority, because the applicant failed to suggest a figure.
 - as selected by this Authority, because this figure better characterizes the invention.
 - b. none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/031788

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6

Method for scrubbing a flash memory array in response to a scrub trigger event, whereby a data unit of a first memory block is read and, if necessary, corrected, thereafter writing said corrected data unit to a second memory block and copying the remaining uncorrected data units of said first memory block to said second memory block.

2. claims: 7-10

Method for scrubbing a flash memory array in response to a scrub trigger event, whereby data of a memory location of said array is read and examined for errors, which erroneous data is corrected and written back to the memory array, whereby said read data is temporarily stored, either prior to or after said correction has taken place, and during which temporary storage of the read data a different memory location of said memory array is being read/programmed.

3. claims: 11,12

Method for scrubbing a flash memory, whereby page data of a memory block is read using a first set of reading conditions and in case of an uncorrectable error being detected, re-reading the page data using a second set of reading conditions, and determining if correctable errors exist in the re-read data, in which case these correctable errors are corrected and written to a different memory block, while deferring the scrubbing cycle in response to other memory activity being scheduled.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/031788

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F11/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 263 032 A (PORTER ET AL) 16 November 1993 (1993-11-16)	1,4
Y		2
A	column 1, line 8 - column 1, line 59 column 2, line 17 - column 2, line 22 column 3, line 40 - column 3, line 53 column 4, line 13 - column 5, line 14 column 5, line 39 - column 6, line 17 column 7, line 6 - column 7, line 58 column 10, line 45 - column 10, line 62 figures 2,3,8 ----- -/-	3,5,6

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

*** Special categories of cited documents :**

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

25 April 2005

Date of mailing of the international search report

31/05.05

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Johansson, U

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/031788

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 199 139 B1 (KATAYAMA YASUNAO ET AL) 6 March 2001 (2001-03-06)	1,4
A	column 5, line 66 - column 6, line 66 column 7, line 47 - column 8, line 11 figures 1,3,4 -----	2,3,5,6
X	US 4 694 454 A (MATSUURA ET AL) 15 September 1987 (1987-09-15)	7,9
Y	column 2, line 32 - column 2, line 68	2
A	column 4, line 28 - column 4, line 55 column 2, line 32 - column 2, line 68 column 3, line 25 - column 3, line 55 column 5, line 59 - column 5, line 67 column 6, line 60 - column 7, line 57 column 10, line 3 - column 10, line 53 claim 1 figures 1,4 -----	8,10
X	GB 2 289 779 A (* INTEL CORPORATION) 29 November 1995 (1995-11-29)	7-10
Y	page 4, line 19 - page 6, line 6 page 12, line 6 - page 12, line 10 page 13, line 19 - page 14, line 13 page 15, line 7 - page 17, line 7 claims 1,2,4,5 figures 2,3 -----	11,12
Y	US 5 475 693 A (CHRISTOPHERSON ET AL) 12 December 1995 (1995-12-12) column 3, line 38 - column 3, line 67 column 5, line 25 - column 6, line 15 column 6, line 66 - column 7, line 14 column 9, line 13 - column 10, line 53 column 11, line 33 - column 12, line 23 figures 2,3,5 -----	11,12
A	US 6 560 152 B1 (CERNEA RAUL-ADRIAN) 6 May 2003 (2003-05-06) the whole document column 1, line 33 - column 1, line 41 column 2, line 9 - column 2, line 32 column 3, line 8 - column 3, line 30 figures 1,2 claim 1 -----	11,12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/031788

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5263032	A	16-11-1993	NONE		
US 6199139	B1	06-03-2001	JP	3177207 B2	18-06-2001
			JP	11213659 A	06-08-1999
			TW	436786 B	28-05-2001
US 4694454	A	15-09-1987	JP	61034793 A	19-02-1986
GB 2289779	A	29-11-1995	AU	2647395 A	18-12-1995
			CN	1149344 A ,C	07-05-1997
			DE	69522457 D1	04-10-2001
			DE	69522457 T2	23-05-2002
			EP	0775343 A1	28-05-1997
			SE	517214 C2	07-05-2002
			SE	9501925 A	25-11-1995
			WO	9532470 A1	30-11-1995
			US	6101614 A	08-08-2000
US 5475693	A	12-12-1995	AU	4606396 A	19-07-1996
			CN	1175311 A ,C	04-03-1998
			DE	69526123 D1	02-05-2002
			DE	69526123 T2	21-11-2002
			EP	0813711 A1	29-12-1997
			HK	1008584 A1	01-11-2002
			WO	9620443 A1	04-07-1996
US 6560152	B1	06-05-2003	EP	1440446 A1	28-07-2004
			WO	03041082 A1	15-05-2003

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

		Date of mailing (day/month/year) see form PCT/ISA/210 (second sheet)
Applicant's or agent's file reference see form PCT/ISA/220		FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/US2004/031788	International filing date (day/month/year) 28.09.2004	Priority date (day/month/year) 03.10.2003
International Patent Classification (IPC) or both national classification and IPC G06F11/10		
Applicant SANDISK CORPORATION		

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Authorized Officer
 European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Johansson, U Telephone No. +49 89 2399-2509
	

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2004/031788

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - a sequence listing
 - table(s) related to the sequence listing
 - b. format of material:
 - in written format
 - in computer readable form
 - c. time of filing/furnishing:
 - contained in the international application as filed.
 - filed together with the international application in computer readable form.
 - furnished subsequently to this Authority for the purposes of search.
3. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/031788

Box No. IV Lack of unity of invention

1. In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
 - paid additional fees.
 - paid additional fees under protest.
 - not paid additional fees.
2. This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
 - complied with
 - not complied with for the following reasons:

see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
 - all parts.
 - the parts relating to claims Nos. 1-12

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or
industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-12
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-12
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/031788

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

IV. LACK OF UNITY OF INVENTION

In accordance with Rule 13 PCT, the International Searching Authority (ISA) has previously found that the international application does not comply with the requirements of unity of invention as set forth in Rule 13 PCT, the detailed reasons for which are specified in the Annex to form PCT/ISA/206 ("COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH").

As, till date, the applicant has not paid additional fees in accordance with Article 17(3)(a) PCT and Rule 40.1 PCT, this WO-ISA has been drawn up to cover claims 1-6 relating to the first invention, which is considered to be the "main invention" in the sense of Article 17(3)(a) PCT.

V. REASONED STATEMENT UNDER RULE 44bis1(a)(i) WITH REGARD TO NOVELTY, INVENTIVE STEP AND INDUSTRIAL APPLICABILITY; CITATION AND EXPLANATIONS SUPPORTING SUCH STATEMENT

1. The following documents (D1/D2/D3), of which D1 is considered to represent the most relevant prior art teaching, are mentioned for the first time in this written opinion; the numbering will be adhered to in the rest of the procedure:

D1 : US 5 263 032 A (PORTER ET AL) 16 November 1993 (1993-11-16)
D2 : US 6 199 139 B (KATAYAMA YASUNAO ET AL) 6 March 2001 (2001-03-06)
D3 : US 4 694 454 A (MATSUURA ET AL) 15 September 1987 (1987-09-15)
D4 : GB 2 289 779 A (INTEL CORP.) 29 November 1995 (1995-11-29)
D5 : US 5 475 693 A (CHRISTOPHERSON ET AL) 12 December 1995
 (1995-12-12)
D6 : US 6 560 152 B (CERNEA R. A.) 6 May 2003 (2003-05-06)

2. Concerning the first invention, claims 1-6:

The international application does not comply with the requirements of Article 33(3) PCT concerning inventive step as the subject-matter of the independent claim 1 of the international application does not involve an inventive step in view of the teaching

of D1. The detailed reasons behind this opinion are as follows:

2.1. Turning to the prior art teaching of D1, adopting the general structure of independent claim 1 of the international application and with general reference taken to the disclosure of document D1 on column 1, lines 48-59; column 2, lines 17-22; column 3, lines 40-53; column 4, line 13 - column 5, line 14; column 5, line 39 - column 6, line 17; column 7, lines 6-58; column 10, lines 45-62 taken in combination with figures 2, 3 and 8 of the same document, and with reference numerals as defined in D1, D1 teaches:

A method for operating a DRAM memory cell array (12) that is organized into a plurality of sub-arrays formed by DRAM devices (20) including memory blocks of a minimum number of memory cells and the blocks storing a number of units of data (e.g 512 bytes) [see in particular D1, column 2, lines 17-22; column 3, lines 45-53; column 4, lines 13-19; figures 2,3], the method comprising:

- identifying when a scrub trigger event in the form of the occurrence of a read request ECC error correction has occurred for data stored in at least one of the units of data in a first memory block [see in particular D1, column 4, line 65 - column 5, line 2; column 5, lines 13-14];
- reading the identified at least one unit of data from the first block [see in particular D1, column 5, lines 54-57];
- correcting any errors in the data read from the first block to provide corrected first block data [see in particular D1, column 5, lines 54-57];
- performing a block replacement for said first block in order to eliminate a suspected hard error within said first block by writing the corrected first block data as at least one unit of data together with the remaining uncorrected parts of said first block into a second replacement block if the detected scrub event regards a second scrub event, as indicated by a previously generated scrub event "footprint", for that same memory location of the DRAM memory cell array (12), thereby to consolidate in the second replacement block corrected and uncorrected units of data originally stored in the first block [see in particular D1, column 5, line 62 - column 6, line 12].

From the recitation of the teaching of D1 above, while noting that the term "page" used in D1 directly corresponds to the term "block" used in claim 1 of the international

application (see column 3, lines 49-50 of D1), it is immediately clear that the single technical feature of claim 1 that is not explicitly disclosed by the teaching of D1 regards that the memory cell array is of a flash type.

However, to the skilled person, it would be obvious to apply the method for operating a DRAM memory cell array, as taught by D1, to any type of memory, i.e.. also to a sector-erasable flash-type memory cell array should the skilled person, under the circumstances at hand, consider the use of a flash-type memory. To this end, the use of the method for operating a memory cell array known from D1 for a flash-type memory would be straightforward as not requiring any particular amendment of the method of D1 nor result in any additional surprising effects as compared to those attained when said method of D1 is applied to a DRAM memory cell array. Thus, the replacement of the DRAM memory cell array by a flash-type memory cell array in the teaching of D1 does not involve an inventive step.

Accordingly, the subject-matter of independent claim 1 of the international application does not meet the requirements of Article 33(3) PCT concerning inventive step.

2.2. Concerning the dependent claims 2-6 of the first invention:

The dependent claims 2-6 of the international application do not comply with the requirements of Article 33(3) PCT as the subject-matter of the said dependent claims 2-6 does not involve an inventive step. The reasons being the following:

With respect to the dependent claims 2-6 of the international application, the examiner has neither been able to identify any technical matter of said claims, which meets the requirements concerning both novelty and inventive step. On the contrary, the subject-matter of said dependent claims 2-6, to the extent that it cannot be directly derived from a straightforward combination of the prior art teachings of D1 and D3, merely regards either known technical features concerning straightforward design possibilities from which the skilled man would choose without requiring the use of inventive skills or an obvious design selection out of a variety of possibilities, where said selection is not associated with any surprising effect. To this end, it is specifically to be noted that the subject-matter of dependent claim 4 of the

international application is explicitly anticipated by the disclosure in D1 on column 5, lines 2-3. Thus, the subject-matter of said dependent claims 2-6 of the international application can not be seen as meeting the requirements of Articles 33(3) PCT concerning inventive step.

3. Concerning the second invention, claims 7-10:

The international application does not comply with the requirements of Article 33(3) PCT concerning inventive step as the subject-matter of the independent claims 7 and 9 of the international application does not involve an inventive step in view of the teaching of D4. The detailed reasons behind this opinion are as follows:

3.1 Adopting the general structure of independent claim 9 of the international application and with general reference taken to the disclosure of document D4 on page 4, line 19 - page 6, line 6, page 12, lines 6-10; page 13, line 19 - page 14, line 13, page 15, line 7 - page 17, line 17, claims 1, 2, 4 and 5 and taken in combination with figures 2 and 3 of the same document, D4 teaches:

A method of operating a DRAM memory cell array, comprising :

identifying when a scrub trigger event has occurred for data stored in at least one first location of the memory cell array by means of detecting a correctable error in data read out from said at least one first location in said memory cell array [see in particular D1, page 15, lines 8-13 and lines 20-23];

reading the data stored in said at least one first location in the said memory cell array [see in particular D1, page 5, lines 3-5; page 13, lines 19-22];

thereafter determining whether there are any errors in the data read from said at least one first location in said memory cell array [see in particular D1, page 5, lines 3-5; page 14, lines 3-6 and lines 8-9];

correcting any correctable errors in the data read from said at least one first location in said memory cell array [see in particular D1, page 5, lines 3-5; page 14, lines 3-6];

temporarily storing said corrected data in a read data buffer [see in particular D1, page 5, lines 3-5; page 12, lines 6-10; page 14, lines 9-13];

while the corrected data remain temporarily stored in said read data buffer,

performing other memory accesses for writing or reading other data to or from at least one second location within the array other than said at least one first location, and thereafter writing the corrected data into said memory cell array [see in particular D1, page 5, line 7 - 13; page 15, lines 18-25; claim 5].

From the recitation of the teaching of D4 above, it is immediately clear that the single technical feature of claim 9 that is not explicitly disclosed by the teaching of D4 regards the memory being of a flash type, but instead refers to a general DRAM memory.

However, to the skilled person, it would be obvious to apply the method for operating a DRAM memory cell array, as taught by D4, to any type of memory, i.e. also to a sector-erasable flash-type memory cell array should the skilled person, under the circumstances at hand, consider the use of a flash-type memory. To this end, the use of the method for operating a memory cell array known from D4 for a flash-type memory would be straightforward as not requiring any particular amendment of the method of D4 nor resulting in any surprising effect as compared to those attained when said method of D4 is applied to a DRAM memory cell array. Thus, the replacement of the DRAM memory cell array by a flash-type memory cell array in the teaching of D4 does not involve an inventive step.

Accordingly, the subject-matter of independent claim 1 of the international application does not meet the requirements of Article 33(3) PCT concerning inventive step.

3.2. With reference to independent claim 7 of the international application, it is noted that the subject-matter of said claim 7 differs from the subject-matter of independent claim 9 in that it teaches the data read from said memory cell array to be subjected to error detection and correction after its temporary storage, whereas the independent claim 9 teaches said data read from said memory cell array to be subjected to error detection and correction prior to its temporary storage. However, to the skilled person having knowledge of the teaching of D4, it would be well within the reach without resorting to inventive skills to adapt the teaching of D4, in line with the specific circumstances at hand, to perform the error detection and correction of read data after the temporary storage in the read data buffer. This would also not bring any surprising effect apart

from that already brought by D4.

Accordingly, for the same reasons as given for independent claim 9 in section 3.1 above, also not the subject-matter of independent claim 7 of the international application meets the requirements of Article 33(3) PCT concerning inventive step.

3.3. Concerning the dependent claims 8 and 10:

The dependent claims 8 and 10 of the international application do not comply with the requirements of Article 33(3) PCT as the subject-matter of the said dependent claims 8 and 10 does not involve an inventive step. The reasons being the following:

In the disclosure of D4 on page 14, lines 1-13, it is taught that the detection of an error in data read from the memory array triggers a scrub event of the data stored on the corresponding memory location from which the erroneous data was read. Accordingly, the technical features defined in the dependent claims 8 and 10 of the international application are fully anticipated by the teaching of D4. Accordingly, for the reasons given for the independent claims 7 and 9 in sections 3.1 and 3.2 above, also not the subject-matter of the dependent claims 8 and 10 of the international application meets the requirements of Articles 33(3) PCT concerning inventive step.

4. Concerning the third invention, claims 11,12:

The international application does not comply with the requirements of Article 33(3) PCT concerning inventive step as the subject-matter of the independent claim 11 of the international application does not involve an inventive step in view of the teachings of D4 and D5 taken in combination. The detailed reasons behind this opinion are as follows:

4.1. Adopting the general structure of independent claim 11 of the international application and with general reference taken to the disclosure of document D5 on column 3, lines 38-67, column 5, line 25 - column 6, line 15, column 6, line 66 - column 7, line 14, column 9, line 13 - column 10, line 53, column 11, line 33 - column 12, line 23 taken in combination with figures 2, 3 and 5 of the same document, D5

teaches:

A method for operating an erasable and re-programmable non-volatile memory system having an array of memory cells organized into blocks of a minimum number of memory cells that are erasable together that include a plurality of pages (as referred to as 'sectors'/LSNn in D5) individually storing one or more units of data [see in particular D5, column 3, lines 38-46; column 5, lines 58-64; column 7, lines 6-10], comprising:

in response to the occurrence of at least one of a plurality of predefined events, namely, either at system startup, at memory sector read or at sector clean-up, identifying at least one page (i.e. 'sector') of at least one block to be scrubbed [see in particular D5, column 11, lines 33-40],

reading data stored in said at least one page (i.e. 'sector') with a first set of read conditions [see in particular D5, column 5, lines 40-41],

determining whether there are any errors in the read data, and, if so, whether the errors can be corrected [see in particular D5, column 11, lines 41-43 and lines 46-49; figure 5],

in response to determining that the errors in the read data cannot be corrected, re-reading the data in said at least one page with a second set of read conditions [see in particular D5, column 11, line 53-56 and lines 60-63; column 11, lines 66 - column 12, lines 4; figure 5],

determining whether there are any errors in the re-read data, and, if so, whether the errors can be corrected [see in particular D5, column 12, lines 5-9; figure 5],

in response to determining that the errors in either of the read or re-read data can be corrected, correcting such errors to provide corrected data [see in particular D5, column 12, lines 9-10; figure 5], and

writing the corrected data into at least a second page of a second block different from said one block [see in particular D5, column 5, line 53 - column 6, line 15].

From the recitation of the teaching of D5 above, it is immediately clear that the subject-matter of the independent claim 11 differs from the teaching of D5 merely in that the correction of errors in the read/re-read data is deferred until other memory activity has completed.

However, with reference to what was stated in section 3.1 above in relation to the independent claim 9 of the second invention, it is well known in the art (see e.g. D4) to defer the activities relating to the detection of erroneous read data, namely, to temporarily storing the corrected data and deferring the re-write operation of the corrected data until other memory activities with a higher priority have completed. As further argued in section 3.2 in relation to the independent claim 7 of the second invention, it would be immediately apparent to the skilled person, in line with any particular circumstances at hand requiring so, to also defer the correction of the erroneous data read from said memory array in a similar manner.

Accordingly, faced with the problem of unacceptable delay in the execution of high priority tasks due to any time-consuming error correction process arising from the teaching of D5, the skilled person would immediately turn to the solution to said problem as proposed by the teaching of D4, with the aim of adapting the teaching of D5 accordingly. Such a straightforward combination of the teachings of D4 and D5, which would neither require any inventive activity nor would it result in any surprising effect, immediately anticipates the subject-matter of the independent claim 11 following a straightforward extrapolation of the technical features. Accordingly, the subject-matter of independent claim 11 of the international application does not meet the requirements of Article 33(3) PCT concerning inventive step.

4.2. Concerning the dependent claim 12 of the third invention:

With reference to the technical feature defined in the dependent claim 12 of the international application, it is well-known in art relating to flash EEPROM memories to perform updates to a block in that the updated sectors of said block together with the unchanged sectors of said block are written to a clean erased block. Such an arrangement is disclosed for instance by D5, column 5, line 53 - column 6, line 15. Accordingly, for the same reasons as given for the independent claim 11 in section 4.1 above, also not the subject-matter of the dependent claim 12 complies with the

requirements of Article 33(3) PCT concerning inventive step.

VII. CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION

1. In order to meet the requirements of Rule 5.1(a)(ii) PCT, the documents D1-D5 should be identified in the description of the international application and the relevant prior art therein should be briefly discussed.
2. In order to meet the requirements of Rule 6.3(b)(i) and (ii) PCT, the independent claims of the international application should be properly cast in the two-part form using the wording "characterized by", with those features forming part of the prior art being placed in the preamble.
3. In order to meet the requirements of Rule 6.2(b) PCT, reference numerals should, where appropriate, be introduced in the claims to increase their intelligibility.
4. The statements made in paragraph [0136] on page 45 of the description regards matter obviously irrelevant under the circumstances and should, thus, be deleted, Rule 9.1(iv) PCT.

VIII. CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION

1. The independent claims 7 and 9 of the international application relating to the second invention do not meet the requirements of Article 6 PCT for the following reasons:
 - 1.1. The two independent claims 7 and 9 of the international application, both of which relates to the second invention, define distinct sets of technical features, which sets of features do not in an unambiguous manner correspond to one another.

As a direct consequence to the fact that the two independent claims define distinct sets of technical features, obscurity is introduced by the independent claims 7 and 9 as to what features are actually being essential to the performance of said second invention, contrary to the requirements of Article 6 PCT.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.
PCT/US2004/031788

1.2. Both of said claims on a number of occasions refer to the wordings "in at least one location in the array", "in said at least one location in the array" and "said at least one location". To this end, it is noted that, as perceived from the general understanding of said second invention as disclosed in the description, two different portions of said array are actually being referred to, namely, "at least one first location of the array" relating to the data to be corrected and "at least one second location of the memory array" relating to the "programming or reading of other data" while said data read from said "at least one first location of the array" is being temporarily stored. The lack of distinction between said "at least one first location of the array" and said "at least one second location of the array" in the independent claims 7 and 9 results in ambiguity as to the overall functioning of the second invention and thereby also rendering the scope of said claims obscure, contrary to Article 6 PCT. Throughout this communication, the aforementioned perceived meaning and distinction between said first and second location(s) of the array is being assumed.

1.3. Furthermore, it is noted the feature "while this information remains stored, programming or reading other data to or from at least [one] second location within the array other than said at least one first location", as defined in the independent claims 7 and 9, suffers from a further clarity problem. This is as it is not unambiguously defined to which location said wording "remains stored" refers to. As a result, said ambiguity renders the scope of said independent claims 7 and 9 obscure, contrary to Article 6 PCT. As is perceived from the general disclosure of the second invention in the description, it can be perceived that said the previously defined feature refers to the temporary information storage. Accordingly, the corresponding features of the independent claims 7 and 9 should be clarified to unambiguously reflect this. Throughout this communication, this assumption concerning the meaning of said feature is being adopted.